DOCUMENT RESUME

ED 185 770 EC 123 925

AUTHOR Deno, Stanley L.; Mirkin, Phyllis K.
TITLE Data-Based IEP Development: An Approach to Substantive Compliance.
INSTITUTION Minnesota Univ., Minneapolis. Inst. for Research on Learning Disabilities.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
REPORT NO IRLD-Mono-7
PUB DATE Dec 79
CONTRACT 300-77-0491
NOTE 41p.; See also EC 123 901-924.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Compliance (Legal); Data Analysis; Educational Methods; Elementary Secondary Education; *Learning Disabilities; Program Development; *Program Effectiveness; *Program Evaluation
IDENTIFIERS *Data Based Program Modification; *Individualized Education Programs

ABSTRACT

The authors describe the development and use of a structured, data base approach to developing individual education programs for special education students. The components of the "Data-Based Program Modification" (DBPM) approach are described to include five decision areas: problem selection; program selection (least restrictive yet most effective); program operationalization (including identification of goals and frequent measurement of goal progress); program improvement; and program certification. Five areas of data gathering in the DBPM are also identified: initial needs assessment, program planning, implementation evaluation, progress evaluation, and outcome evaluation. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

IRLD

Director: James E. Ysseldyke

Associate Director: Phyllis K. Mirkin

The Institute for Research on Learning Disabilities is supported by a contract (300-77-0491) with the Bureau of Education for the Handicapped, Department of Health, Education, and Welfare, U. S. Office of Education, through Title VI-G of Public Law 91-230. Institute investigators are conducting research on the assessment/decision-making/intervention process as it relates to learning disabled children. Research activities are organized into eight major areas:

I. Adequacy of Norm-Referenced Data for Prediction of Success

II. Computer Simulation Research on the Assessment/Decision-making/Intervention Process

III. Comparative Research on Children Labeled LD and Children Failing Academically but not Labeled LD

IV. Surveys on In-the-Field Assessment, Decision Making, and Intervention

V. Ethological Research on Placement Team Decision Making

VI. Bias Following Assessment

VII. Reliability and Validity of Formative Evaluation Procedures

VIII. Data-Utilization Systems in Instructional Programming

Additional information on these research areas may be obtained by writing to the Editor at the Institute.

The materials presented herein were prepared under government sponsorship. Contractors are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

Monograph No. 13

DATA-BASED IEP DEVELOPMENT: AN APPROACH TO SUBSTANTIVE COMPLIANCE

Stanley L. Deno and Phyllis K. Mirkin

Institute for Research on Learning Disabilities

University of Minnesota

December, 1979

FEB 1 3 1980

Data-based IEP Development:

An Approach to Substantive Compliance*

As never before, (special) educators are being called upon to document the effectiveness of modifications in the programs of individual students. State and federal regulations designed to ensure procedural safeguards for the right to due process require that decisions to change a program be based on evidence regarding what is best for the student. The outcomes of due process hearings frequently turn on the data that is presented by parties involved in the hearing. Distribution of money allocated for special education services is based on the sufficiency of assessment procedures used in determining eligibility. At the same time, the measures that educators and psychologists have traditionally used to assess exceptional students have been criticized as biased, technically inadequate, and appropriate for groups rather than individuals (Ysseldyke, 1979).

One important effect of the demand for accountability and documentation in making IEP decisions has been excessive concern over compliance with the procedural requirements of P.L. 94-142 and its regulations, with some loss in concern for substantive compliance (Prehm & McDonald, 1979). While procedural compliance ensures (as some wits have put it) "staying out of jail," it does not guarantee substantive compliance -- the development of a successful program for an individual student. The distinction between procedural and substantive compliance is important because it reminds us that it is possible to meet the letter of the law without meeting its intent.

---

*Some of the essential ideas presented here are based on concepts in Data-Based Program Modification by S. L. Deno and P. K. Mirkin (Reston, Va.: Council for Exceptional Children, 1977).

For a period of seven years, we (Deno & Mirkin, 1977) have been developing a structured, data-based approach to developing individual educational programs that derives from the evaluation model developed by the Center for the Study of Evaluation (Klein, Fenstermacher, & Aiken, 1971), and that rests heavily on the research methods used to study treatment effects with single subjects (Hersen & Barlow, 1976). The details of that approach, which we call "Data-Based Program Modification (DBPM)," are beyond the scope of this paper. We will, instead, present only the major elements of the approach as they apply to developing an IEP for a single special education student. We believe that this approach results in both procedural and substantive compliance with the requirements of P.L. 94-142.

Major Assumptions

DBPM is based on several critical assumptions about special education services:

1. Special education is an intervention system, designed to produce changes in the educational programs of selected individuals.
2. The purpose of special education intervention is to improve individual educational programs.
3. The chance that any change in an individual's program will actually be an improvement is low enough to require that we should continuously evaluate the effects of program changes.

Elements of the DBPM Model

Within DBPM there are identified five decision areas and five

concomitant data gathering phases. Each decision area addresses a different program development question and requires data gathering as the basis for decision making.

Table 1 identifies the questions to be answered and the data to be gathered during each of the five program phases in relation to the five decision areas. It should be noted that the information gathering activities that are specified are often the responsibility of one or more persons. Decision making, however, is always colloborative and involves people and values as well as numbers.

- - - - - - - - - - - - - - - - - -

Insert Table 1 about here

- - - - - - - - - - - - - - - - - -

A general overview of the data gathering and decision-making activities are described below.

Problem Selection: What are the problems that provided impetus for the referral and imply the need for program modification and special education service?

This phase typically begins when a student is initially referred for consideration for special education service. The problems precipitating the referral and specified on the referral form are the basis for structured interviews with the student, his/her teachers, parents, and other concerned individuals. Each person is asked to rank order the importance of the academic and social behaviors that precipitated the referral. A sample priority ranking form is shown in Figure 1. This list establishes an objective basis for defining the problem(s) specified in the referral statement and provides the direction for subsequent assessments. The

important assumption is that the student's performance on school-related tasks is what leads to the teacher's opinion that the student is successful or unsuccessful. Assessment is thus directed to specific areas of difficulty in the school curriculum rather than to generalized patterns of disability.

- - - - - - - - - - - - - - - - - -

Insert Figure 1 about here

- - - - - - - - - - - - - - - - - -

The priority rankings provided by the persons most directly involved with the student (including the student) guide initial data-gathering activities. These consist primarily of determining both the student's current level of proficiency in the prioritized curriculum areas and the expectations for desired performance in these areas as expressed by teachers, parents, school requirements, and the student on the priority ranking form. Assessment of this type has the advantage of placing the student within an instructional sequence. At the same time, it eliminates the gap between traditional diagnosis and remediation that is so troublesome to educators.

One important value of DBPM is that continuity of data collection is preserved from the initial assessment through program modification to outcome evaluation. Thus, the same type of data which led to judgments that a discrepancy existed are used to make judgments about whether a program is working, and finally, whether the program has been successful. This continuity contrasts sharply with systems for modifying programs that rely on measurements of performance unrelated to actual classroom performance (e.g., individual standardized tests) and that usually obtain data only at the beginning and end of a program.

In many school systems, it is not uncommon for a student's eligibility for special education services to be determined by a school psychologist or other professional who works outside of the classroom setting and bases eligibility judgments on standardized intelligence or personality tests. If the student is declared eligible for the special services, he/she must be "reassessed" by special educators; since they must determine the kind of intervention to organize for the student, they may use some kind of standardized achievement test as the basis for their judgments. During the intervention period, the special educator collects the available data on the student's performance; these data generally are generated by classroom exercises and the teacher's judgment. Then, another standardized achievement test may be used to measure the student's achievement upon program completion. Each set of test results used to assess the student's performance is a discrete unit that has nothing to do with preceding or succeeding test results. In fact, what is being measured may be differences in the various test tasks rather than differences in the student's performance. Some examples of the types of data collected under traditional approaches and the DBPM model are presented in Table 2.

- - - - - - - - - - - - - - - - - -

Insert Table 2 about here

- - - - - - - - - - - - - - - - - -

Communication problems among personnel responsible for decision making are exacerbated in the traditional approach by the lack of continuity and focus in data-collection activities. Further, the lack of comparability in tasks used to measure performance throughout the program modification makes it difficult to make valid judgments about program

effectiveness. Finally, pre- and posttesting of students, even when the same instruments are used, cannot be used as an evaluation design.

Although the example in Table 2 is an oversimplification, it depicts the greater degree of continuity in the data used for decision making in DBPM, and the potential for clearer communication among all persons involved in the program modification process. The formulation also fits with the notion that the problem is not a condition residing within the student; rather, the problem is the discrepancy that exists between the student's actual performance and the performance desired from him/her. The eligibility decision revolves around agreement on what the problems are and how important they are, based on the priorities that are established, and the discrepancy data that are gathered. The magnitude of the discrepancy and the perceived importance of the particular curriculum to the individual student enter into the decision. However, it also is the responsibility of individual school districts to prioritize goals for programs as well as for individual students. These also must be considered in the eligibility decision.

Program Selection: What program plan is likely to be least restrictive and yet effective in solving the referrer's problems?

Program plans must adequately reflect the concerns expressed during problem selection. The exhaustive nature of these activities can be justified only if the resulting plan is more appropriate for the student and satisfactory to student, parents, and teachers than would otherwise have occurred. Agreeing upon program selection therefore involves a written plan that specifies: (a) the curriculum areas in which significant discrepancies have been identified, (b) long and short-range

instructional goals for each discrepancy selected, (c) procedures for measuring progress on goals on a regular basis (i.e., daily or weekly), (d) at least two teaching strategies to be tried in an effort to reduce identified performance discrepancies, and (e) administrative arrangements to be used.

The basic assumption in the development of alternative teaching strategies is that the chances of solving a problem successfully are increased if multiple solutions, rather than just one solution, are available. No problem ever has just a "single solution"; a number of alternative solutions can be devised for almost any problem and each offers some possibility of success.

The creation of alternative solutions is an important characteristic of DBPM. It emphasizes an experimental approach to educational problem solving. The uniqueness of each individual, as well as our present state of knowledge in special education, make it impossible to predict the specific effects of any single change or set of changes, on the individual. If alternative changes are devised and considered during program planning, then these alternatives can be tested to find the program that is most successful and to obtain cumulative benefits through progressive alterations or modifications in the existing program. Furthermore, by making explicit the program plan as well as the changes to be made in a student's educational program, accountability and shared responsibility are increased by establishing a mutual commitment to a common goal, making public who is responsible for the program decision, how those decisions are made, and when program changes will be initiated.

The key or central element of successful DBPM is the graphed record of student development on the identified discrepancies that are the

focus of the program. A graph of observed development over time (time series data) provides the information needed to make critical decisions about the student's movement from past to present status in the program of instruction. Further, it affords some basis for predicting future development under different instructional, motivational, and/or administrative arrangements. In the long run, the graphed relation between changes in the student's development and changes in the program provides the data base for making evaluative judgments about special education intervention.

In DBPM, two basic graphs are used to display daily, weekly, and monthly data:

1. Progress (or Mastery) Graphs
2. Performance Graphs

Progress (or mastery) graphs. A progress (or mastery) graph is constructed to display the time a student takes to master a set (usually, ordered over time in terms of sequence and/or complexity) of instructional objectives. In constructing the graph, the series of objectives on which the student is working and the time in which they are expected to be achieved is shown on the ordinate (up the left side); the time in which the student is working on the objectives is shown on the abscissa (across the bottom). A point is plotted at the intersection of the relevant vertical time line and horizontal objectives line when mastery has occurred. Points are plotted sequentially and connected; the result is a line showing the one-to-one relation between time of mastery and time in school.

The progress graph can be used in any classroom or program in which

specified tasks to be mastered can be identified in relation to time. The tasks may be objectives that are independent of any particular curriculum, or they may be requirements embedded within a particular curriculum sequence. In the objectives-based approach, where the tasks are independent of a particular curriculum, the sequence of objectives to be attained and the time allotted for attainment are laid out on the ordinate, and the days, weeks, or months of school attendance are listed on the abscissa. In the specific curriculum and curriculum-sequence approach, the abscissa is also labeled for time in school by days, weeks, or months and the ordinate shows the curriculum sequence and the time allotted for attainment of each item of the sequence. Figure ? illustrates the graph organizations for the two approaches.

- - - - - - - - - - - - - - - - - -

Insert Figure 2 about here

- - - - - - - - - - - - - - - - - -

In both approaches, the graph is a square drawn on equal-interval paper. On both axes, the same number of lines are marked to represent equal time periods. On the vertical axes, the tasks are spaced according to the mastery time expected of average students in the curriculum. Thus, the graph is organized so that for the average student the level of progress (mastery) is one to one: For each week, month, or year in the program the average student is expected to master the number of tasks designated for that week, month, or year. If achievement of average students is plotted week by week, month by month, and year by year, the line connecting these points is a diagonal from the lower left corner to the upper right corner of the graph.

For the target student, the progress level usually differs from the one-to-one ratio because, typically, he/she has not achieved a week's, month's, or year's progress in the designated time period. Thus, when the target student's mastery level is plotted on the graph, the discrepancy between his/her progress and that of average students is graphically illustrated by the distance of progress points from the diagonal line of average progress.

Performance graphs. A performance graph is designed to display how a student's behavior changes on a single task, such as "oral reading from an age/grade appropriate test" or "off-task behavior during work time," over time. On the performance graph, the abscissa again shows the time in days, weeks, or months of the program during which measurements are made. The ordinate simply shows the level of performance on that single task on a day when that performance was measured. Thus, in Figure 3(a), the ordinate (vertical axis) shows the number of words read correctly and incorrectly per minute: in Figure 3(b), the ordinate shows the number of off-task behaviors per minute during work time.

- - - - - - - - - - - - - - - - - -

Insert Figure 3 about here

- - - - - - - - - - - - - - - - - -

Either equal-interval or equal-ratio graph paper can be used in developing performance graphs, depending on which is preferred or more useful. In both forms, the vertical lines represent calendar dates. On equal-interval graph paper, the equally spaced horizontal lines can be designated to represent a number, percentage, or rate (frequency). On equal-ratio graph paper, the horizontal lines are so drawn that performance changes which are proportionately equal are visualized as equal. Since a change in behavior from 2 to 4 is a "two times" increase (i.e., $2 \times 2 = 4$), it is shown as equal to a change in behavior from 50 to 100,

which is also a "two times" increase (i.e., 2 x 50 = 100).

Equal-ratio graph paper is semilogarithmic (multiply and divide) rather than additive and has been popularized through Precision Teaching as the Standard Behavior Chart (Pennypacker, Koenig, & Lindsley, 1972). What is often obscured in discussions about the relative merits of equal-interval and equal-ratio graph paper is that both display the results of regular and frequent measurement of student performance over time. Both are designed to permit analysis of time series data. The only real difference between the two is that equal-interval graph paper emphasizes absolute differences and equal-ratio graph paper emphasizes relative differences.

Choosing the right graph. Whether a progress (mastery) graph or a performance graph is used depends solely on the kind of data needed to make program modification decisions. If the rate at which a student is mastering a set of tasks is important, then a progress graph is most useful. If changes in level of performance on individual tasks are more important, then performance graphs are likely to be most helpful. Many teachers develop and maintain both kinds of graphs because they are interested in both kinds of data.

Listed in Figure 4 are some examples of behaviors which can be charted on performance and progress graphs. Note that the level of specificity in the examples increases with the frequency of measurement.

- - - - - - - - - - - - - - - - - -

Insert Figure 4 about here

- - - - - - - - - - - - - - - - - -

Abscissa. The choice of time period for the construction of the graph depends upon the length of the curriculum and the pinpointed behaviors. Monthly progress graphs can be constructed for curricula of

any length, depending on how many years each curriculum spans. Or, a progress graph of the appropriate time period (1/2 year or 2 years) could be made for any part of the curriculum. If a math program were to extend over two years, the monthly progress graph would be constructed for that period. Graphs to record weekly or daily rates of progress and performance work best when they are limited to periods of one school year or less.

Describing discrepancies visually. On a progress or performance graph, it is possible to illustrate visually the discrepancy between the referred student's progress or performance and that of his/her peers who are progressing or performing consistent with cultural expectations and, hence, are considered to be "average."

The weekly progress graph shown in Figure 5, for example, visually illustrates the discrepancy between desired mastery level for average students on a set of math categories and the referred student's actual mastery level on the same set of categories.

- - - - - - - - - - - - - - - - - -

Insert Figure 5 about here

- - - - - - - - - - - - - - - - - -

The daily performance graph shown in Figure 6 is a visual representation of the discrepancy between the number of words read per minute in a textbook by average students and the number read per minute by the target student. (For reasons of space, the graph has been cut down.)

- - - - - - - - - - - - - - - - - -

Insert Figure 6 about here

- - - - - - - - - - - - - - - - - -

The visual display of discrepancies usually provides a measure for communicating most clearly with staff, parents, and child. Many decisions

can be based on visual displays alone. When more precise information is required, however, the discrepancy also can be described numerically.

Describing discrepancies numerically. To compute a numerical discrepancy for a progress graph, two items of information are needed:

1. The desired level of progress (mastery) on the set of tasks (i.e., the curriculum units or objectives) for a reference group of students (usually the average of the same aged peers).
2. The actual level of progress (mastery) of the referred student on the set of tasks.

When the desired and actual levels of progress have been determined, the discrepancy ratio, which is the relative difference between the two levels, is easily computed by dividing the higher level of mastery by the lower level. The result of this division always yields a number that is greater than or equal to 1.0 and specifies the number of times one progress level is greater than another. Ordinarily, the result tells how many times faster the average student is progressing through or performing on the set of tasks than the referred student.

In Figure 5 an individual student's mastery of math objectives was plotted. To determine the discrepancy ratio for this student, follow the numbered steps.

Step 1. Determine Actual Level of Progress. This level is the number of weeks (months or years) of progress achieved in the time already spent in the instructional program. In Figure 7, we see that the student has been in the program for 16 weeks. In that time, he/she has mastered Level I material, which is equal to five weeks of progress for average students.

- - - - - - - - - - - - - - - - - -

Insert Figure 7 about here

- - - - - - - - - - - - - - - - - -

Step 2. Determine Desired Level of Progress. Desired progress is one week for each week in the program. (If the graph were developed for units of days, months, or years, desired progress would be expressed accordingly. The important point is that on progress graphs the relation is always one to one; one unit of progress for one unit of time.) In Figure 7, then, a student who has been in the program for 16 weeks should have mastered 16 weeks of work (in this case, Level III in the curriculum).

Step 3. Compute the Discrepancy Ratio. The higher level of progress must be divided by the lower level of progress. The formula is:

$$\text{Discrepancy Ratio} = \frac{\text{Larger Number (Level of Progress)}}{\text{Smaller Number (Level of Progress)}}$$

$$= \frac{16 \text{ weeks}}{5 \text{ weeks}} = 3.2 \text{ times}$$

Since the discrepancy ratio tells how many times greater one level of progress is than another, the derived 3.2 indicates that students progressing at the desired rate are progressing 3.2 times faster than the target student. (Conversely, the target student is progressing 3.2 times slower than the desired rate of progress.)

To compute the discrepancy for a performance graph, two additional items of information are needed:

1. The desired (usually the median[1]) level of performance of average students on the skill or behavior of interest.
2. The actual (median) level of performance of the referred student prior to program modification.

---

[1] The median is the score that divides the distribution into halves: 50% of the scores fall below the median and 50% above. The median, along with the mode and mean, are measures of central tendency. Any of these measures may be used but the median is preferred because it is less sensitive to extreme scores and is relatively easy to compute.

The procedure used to compute the performance discrepancy ratio is the same as for the progress discrepancy ratio: Divide the higher level of performance by the lower. The result is a number greater than 1.0 that indicates the number of times greater one level of performance is than the other.

In Figure 6, an individual student's performance in oral reading was plotted. The discrepancy ratio in oral reading performance between this student and average students in the class is computed as follows:

Step 1. Determine Actual Level of Performance. There are 11 data points on Figure 6 for the referred student's performance in oral reading. When we order these numbers from low to high -- 48, 49, 50, 52, 52, 52, 60, 60, 70, 75 -- we find that the median (or middle number) is 52. This is actual (baseline) performance for the referred student. Note that if only one sample of performance had been available, we might have a somewhat different picture of this student's performance level in oral reading, depending upon which day testing was done.

Step 2. Determine Desired Level of Performance. Median performance for average students in the school in oral reading is 100 words per minute. This is desired performance.

Step 3. Compute the Discrepancy Ratio. The higher level of performance must be divided by the lower level of performance.

$$\text{Discrepancy Ratio} = \frac{\text{Larger Number (Level of Performance)}}{\text{Smaller Number (Level of Performance)}}$$

$$= \frac{100}{52} = 1.9 \text{ times}$$

In this case, the discrepancy ratio tells us that students who are reading orally at the desired level are performing 1.9 times faster than

the referred student (or the referred student is 1.9 times slower).

Another example is where desired performance = 20/min. and actual performance = 20/min.

In this case:

$$\frac{\text{Larger Level of Performance}}{\text{Smaller Level of Performance}} = \frac{20/\text{min.}}{20/\text{min.}} = 1 \text{ time}$$

Thus, there is no discrepancy. If desired performance = 30/min. and actual performance = 60/min.:

$$\frac{\text{Larger Level of Performance}}{\text{Smaller Level of Performance}} = \frac{60/\text{min.}}{30/\text{min.}} = 2 \text{ times}$$

Thus, actual performance is 2 times faster than desired performance.

Program Operationalization

Once a program has been "operationalized," four key elements must be observed.

1. Goals must be clearly identified and progress on the goals must be measured frequently. A major reason for instructional failures is that goals are only generally defined and progress is measured only occasionally (Bohannon, 1975; Hofmeister & Crutcher, 1975; Jenkins & Gorrafa, 1974). Although teachers often believe that daily interaction with students provides sufficient basis for evaluating student progress, the belief is founded on faith, not facts. Goal setting and measurement are essential to any attempt to change students' progress/performance.

2. A program must be held constant long enough for its effects to appear. When teachers decide to initiate new programs for children with learning difficulties, it is not unusual for them to change different aspects of the programs on an almost daily basis in their zeal to make a difference in the children's progress/performance. Such frequent

changes in instruction are self-defeating, however, for two reasons: (a) the effects of the changes cannot be evaluated, and (b) any potentially beneficial change may be discarded before it is identified. Often, teachers attempting DBPM for the first time find it difficult to be consistent in daily instruction because they feel frustrated when immediate results are not apparent. Yet, once they conquer these initial frustrations, the same teachers find it possible and rewarding to adhere to systematic consistency.

3. Data should be used to make program-change decisions, but some aspects of the program should be changed every 15 school days (3 weeks) or after 15 data points, whichever comes first. We recommend as a "rule of thumb" that some aspect of the program be changed every 15 school days or data points, regardless of how well the program may be going. This recommendation is not difficult to follow, given that most teachers change many aspects of programs daily. However, it may be tempting to hold a program constant when a change is leading to problem solution. Still, we cannot know whether a current program is the best possible one unless we regularly (every 15 days or data points) make changes in at least some aspect of the program to see whether an improvement is possible. Simply increasing or decreasing the amount of time that is spent each day on a particular instructional activity is a change, and it may lead to improvement. When a change is made that decreases progress toward goal attainment, it is reasonable to change back to the previous more successful program.

4. Periodically review program activities to insure that the program is being implemented according to plan and is agreed upon by

those concerned with the referral. The effectiveness of a carefully planned and selected program can be tested only if it is fully implemented. Often, a true test of a program is not made because the people who are responsible for carrying out important aspects have not done so according to the plan. With periodic reviews, the extent to which the program as planned is being implemented can be evaluated and any differences which are detected can be reconciled. Periodic reviews increase the likelihood that an adequate test of a potentially beneficial program will be made. In addition, by formalizing communication among the persons interested in the student's progress, periodic reviews prompt and reinforce the sharing of responsibility that was initiated during problem and program selection.

Program Improvement: Does the program as implemented appear to be moving toward problem solution?

No one can predict with certainty the specific program changes that will eliminate an academic or social discrepancy; such changes can be identified only through the systematic testing of alternatives. In contrast to teaching as it is ordinarily conducted, DBPM is a continuous evaluation design in which programs are deliberately changed and the effects of each change are compared with the effects of previous program changes. Such comparisons enable objective decisions to be made about which changes lead most rapidly to problem solution and which do not. When programs incorporate the data-based procedures outlined here, they have an evolutionary quality; that is, successful changes survive and become a part of the program while unsuccessful changes fall out. The net result of such an approach is the construction of a program that

is cumulative in its effect on problem resolution.

The following review of the procedures that produce these cumulative benefits adds two steps for progress evaluation (Steps 5 and 6).

1. During problem selection, conduct an initial assessment of performance discrepancies to clarify what problems exist and to aid in determining priorities among problems. The data collected during initial assessment should establish a baseline against which subsequent program modifications can be tested. Continuity in programming is established as the data collected initially are the same data that are used in later program evaluation decisions.

2. During program planning, carefully develop a plan containing several alternative program changes that may lead to problem solution. Attempt to predict the relative cost and effects of different alternatives, and develop the attitude that what we try first may work, but if it does not, we have other solutions to test.

3. During program implementation, undertake implementation evaluation to insure that the program which was selected is actually in operation. Improvement of the program will require a data-based decision about the extent to which the program modification has had good effects on the performance discrepancies. For that reason, care must be taken to insure that the time series data collected during initial assessment are also recorded and graphed when the program plan is implemented.

4. Change some aspect of the program after 15 data points have been plotted or three weeks, whichever comes first.

5. After a maximum of three changes have been made, compare the data obtained prior to each program change with the data obtained after each program change to determine whether a clear change in level or

direction has resulted.

6. Maintain those changes which have resulted in program improvement and drop those which have not led to improvement.

Adherence to this routine leads to continuous program improvement, and the improvement is reflected in the graphed data. There is no guarantee that each program change will be successful, but you will know when a change produces demonstrable success.

Learning to interpret graphs is like learning any new concept. You must practice with some assistance and feedback until you become proficient.

Program Certification: Were the problems solved through program modification?

Certifying a program to be satisfactorily completed, like the identification of important problems, involves both objective and subjective judgments. Two types of objective data can be obtained from the record of a student's performance which indicate that a program is successful:

1. Data showing that the progress/performance discrepancy has been completely reduced (actual performance and desired performance lines are identical).
2. Data showing that the program as currently implemented will result in a complete reduction in the discrepancy by the end of the school year (indicated by a trend in the data that, if projected, would coincide with the desired performance line).

Although objective data are central to DBPM, subjectivity is always a part of decision making. Because subjectivity has a significant influence in decision making, it should be controlled as much as possible.

In DBPM, the control is exercised by making subjectivity explicit rather than implicit and embedding the values that influence program certification decisions in a systematic framework.

The procedures in program certification are identical to the procedures that are used in problem selection. Whatever data were the basis for determining eligibility in the first place are now the basis for determining whether the program has been successful. The data needed are the most recent discrepancy ratios for each behavior for which a program was developed and implemented, as well as data on all previous programs which were developed and completed during program implementation.

All parties to the referral should be present (or at least invited[2]) to participate in this decision. The data should be presented and each person (including the student, if appropriate) given the opportunity to review the data, comment on the recommendations, and contribute additional data or recommendations.

The importance of making desires explicit at the outset of modifying a program is manifest in the program certification process. Agreement should be established in writing as a part of the original IEP. If agreement is obtained, then individual values regarding the problems and their importance are negotiated well before consideration of whether the program has been satisfactorily completed. Thus, the IEP can be used as the basis for negotiating eventual program certification. Gallagher (1972) made similar recommendations. Explicit contractual agreements at the point of initial program modification help to reduce potential conflict at the point of program termination.

---

[2] See P.L. 94-142 regarding parents' and students' rights to attend and participate.

It should be noted that many problems can be solved more quickly and simply by renegotiating desired performance. To do so requires that the individuals responsible for the development of students' educational programs realize that changes in desired performance are reasonable. If our schools are to be pluralistic, in the same sense that we presume our American society is, then we must be open to alternative developmental goals as well as alternative programs. To require all children to learn to do or to become the same (i.e., desired performance to be the same for all children), from this viewpoint is inappropriate. One of the responsibilities of program modifiers should be to impact on people's desires as well as students' performance.

References

Bloom, B. S. Learning for mastery. Evaluation Comment, 1968, 1(2).

Bohannon, R. Direct and daily measurement procedures in the identification and treatment of reading behaviors of children in special education. Unpublished doctoral dissertation, University of Washington, Seattle, 1975.

Deno, S., & Mirkin, P. Data based program modification: A manual. Arlington, Va.: Council for Exceptional Children, 1977.

Gallagher, J. J. The special education contract for mildly handicapped children. Exceptional Children, 1972, 38, 527-535.

Hersen, M., & Barlow, D. Single case experimental design. New York: Pergamon Press, 1976.

Hofmeister, A. M., & Crutcher, C. E. Effective uses of objectives and monitoring. Teaching Exceptional Children, 1975, 7(3), 78-81.

Jenkins, J. R., & Gorrafa, S. Academic performance of mentally handicapped children as a function of token economics and contingency contracts. Education and Training of the Mentally Retarded, 1974 9(4), 183-186.

Klein, S., Fenstermacher, G., & Aiken, M. C. The center's changing evaluation model. Evaluation Comment, 1971, 2(4), 9-12.

Pennypacker, H. S., Koenig, C. H., & Lindsley, O. R. Handbook of the standard behavior chart. Kansas City: Precision Media, 1972.

Prehm, H. J., & McDonald, J. E. The yet to be served - a perspective. Exceptional Children, 1979, 45(7), 502-510.

Walberg, H., Schiller, D., & Haertel, G. The quiet revolution in educational research. Kappan, 1979, 61(3), 179-183.

Ysseldyke, J. E. Issues in psychoeducational assessment. In G. D. Phye and D. J. Reschly (Eds.), School psychology: Methods and roles. New York: Academic Press, 1979.

Table 1

Data-Based Program Modification:

Program Decisions and Data-Gathering Processes

Decision Area (Question)	Data-Gathering Process
Problem Selection What are the problems that provided impetus for the referral and imply the need for program modification and special education service?	Initial Needs Assessment: 1. Determine who holds performance expectations for the child, 2. measure the current level and direction of the child's performance, 3. compute the discrepancy ratio between the performance expectations in the child's environment and the child's actual level of performance, 4. establish the importance rating (value) of the discrepancy.
Program Selection What program plan is likely to be least restrictive and yet effective in solving the referrer's problem(s)?	Program Planning: 1. Develop possible long- and short-range instructional goals related to discrepancy ratio, 2. plan alternative instructional strategies for achieving the goals, 3. recommend alternative administrative arrangements, 4. estimate time and resources necessary for attaining different goals using different modifications, 5. specify forces working for or against different modifications.
Program Operationalization Is the agreed-upon program modification being implemented as planned?	Implementation Evaluation (Intervention): 1. Appraise discrepancy between implemented program and planned program, 2. ascertain reasons for discrepancy if one exists, 3. propose alternative ways to reduce discrepancy between planned and implemented program.
Program Improvement Does the program modification as implemented appear to be moving toward problem solution?	Progress Evaluation (Intervention): 1. Appraise progress on short- and long-range alternatives, 2. propose alternative revisions for programs that, apparently, are not affecting performance greatly.
Program Certification Were the problem(s) solved through program modification (intervention)?	Outcome Evaluation (Nonintervention): -- Determine whether modifications have been successful in eliminating the discrepancies which led to initial referral.

Table 2

Examples of Types of Data Collected

Decision	Traditionally	DBPM
Eligibility	WISC IQ Stanford Achievement California Test of Personality	Discrepancies on mainstream curriculum tasks: -oral reading -comprehension -spelling -math computation and concepts, etc. Discrepancies in classroom: -noise -physical contact -out of place -off task -social interaction, etc.
Program Objectives	ITPA SRA Reading and Math Informal Reading Inventory	Same as for Eligibility
Progress Evaluation	Percentage of objectives mastered Teacher estimates "End of book" tests	Same as for Eligibility
Program Effectiveness (certification)	Wide Range Achievement Test Behavior checklist Current curriculum placement	Same as for Eligibility

Directions: May be attached to referral form. Ask each person concerned with student to complete a form.

Referee: Ricky Age/Grade 15/Gr 10 Date 9/12/75

Name of person completing this form: Mr. G / Parent

Specify those goal (terminal) behaviors which you would most like to see attained through program modification.

Academic

Rank		Acceptable Level of Performance
1	General Math	Level III
3	Spelling (English)	75% correct
4	Social Studies Tests	75% correct
5	Handwriting (English - faster and legible Social Studies)	
2	Work Study	Pass

Social

	Noise	none
2	Fights	none

After you complete your list, rank order the list in terms of those most requiring immediate attention.

Figure 1. Example of a Priority Ranking Form

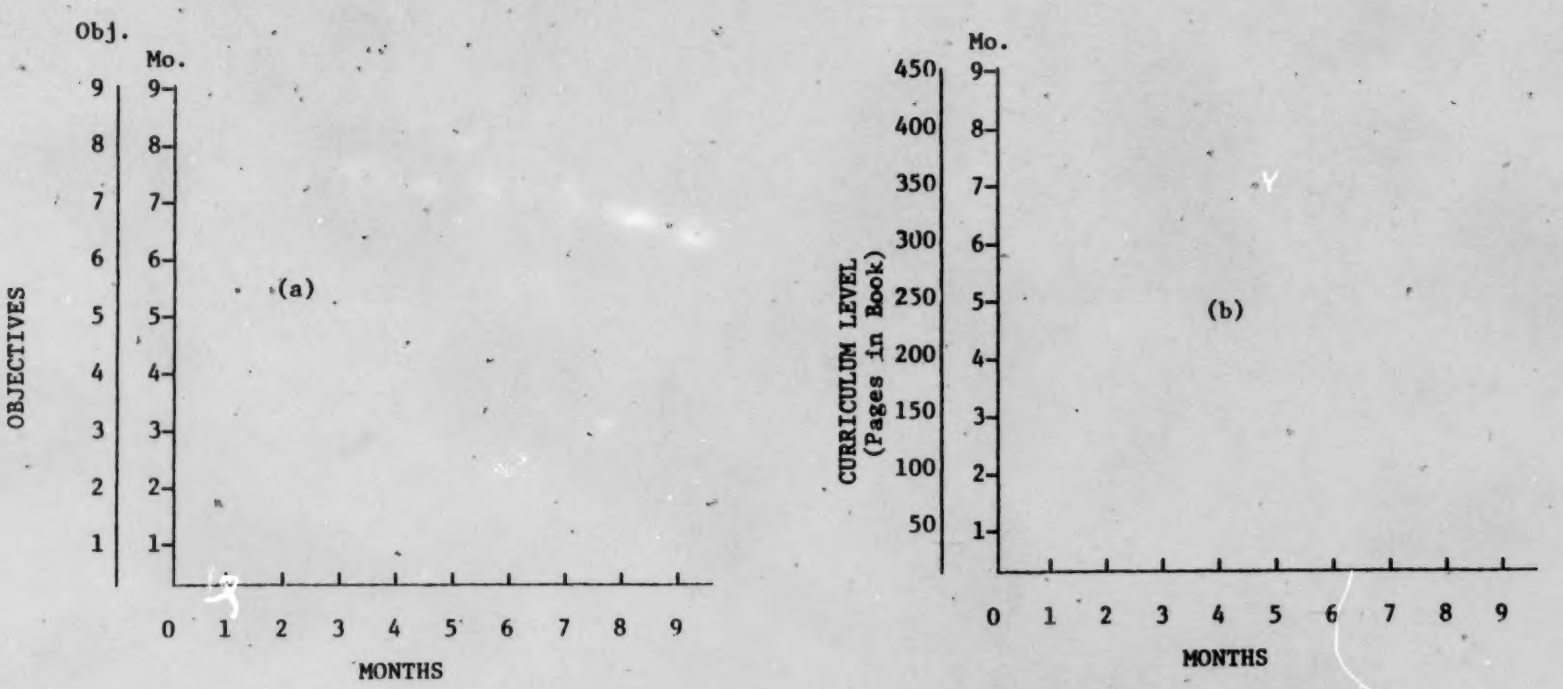

Figure 2. (a) A progress graph organization for an ordered sequence of objectives. (b) A progress graph organization for an established curriculum in science.

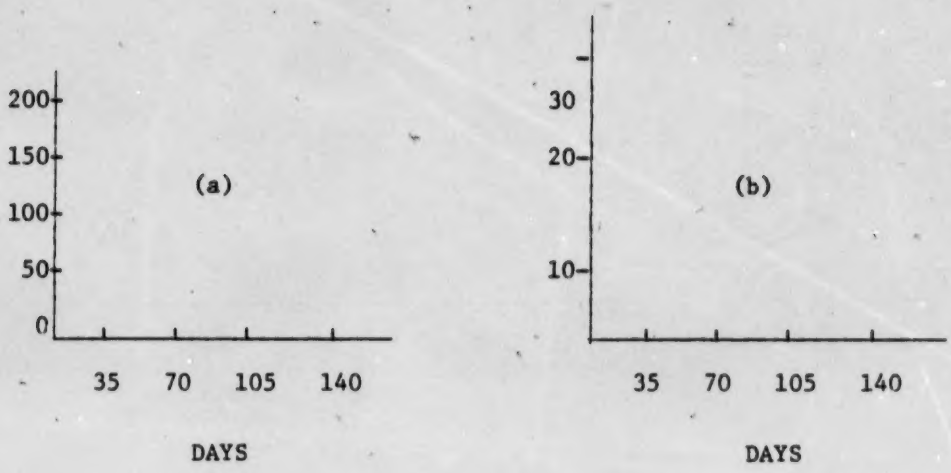

Figure 3. (a) A performance graph for "oral reading from age/grade appropriate reader." (b) A performance graph for number of off-task behaviors.

	Monthly	Weekly	Daily		Monthly	Weekly	Daily
Reading	Cumulative books completed in basal reading series	Cumulative stories completed in basal series Book A	Cumulative pages completed in basal reading series Book A		# of Words read per minute in newspaper/ magazine	# of Words read per minute in grade-level reading material	W of Words read per minute in Book A
	Cumulative library or paperback books read	Cumulative chapters completed in book each week	Cumulative pages completed in book each book each		# of Words read per minute in grade-level reading material	# of Words read per minute from Dale Chall word list	% of Comprehension questions answered correctly
Math	Cumulative units completed in math curriculum	Cumulative objectives completed in math curriculum	Cumulative worksheets completed in math curriculum		% (or # of) Word problems completed per minute	% (or # of) Computation problems completed per minute	% (or # of) Math facts written correctly per minute
	Cumulative contracts completed	Cumulative contract objectives achieved	Cumulative daily objectives achieved		# of Times raises hand during class discussion	# of Assignments completed	# of On-task behaviors per minute

Figure 4. Examples of the types of data which can be plotted on progress and performance graphs

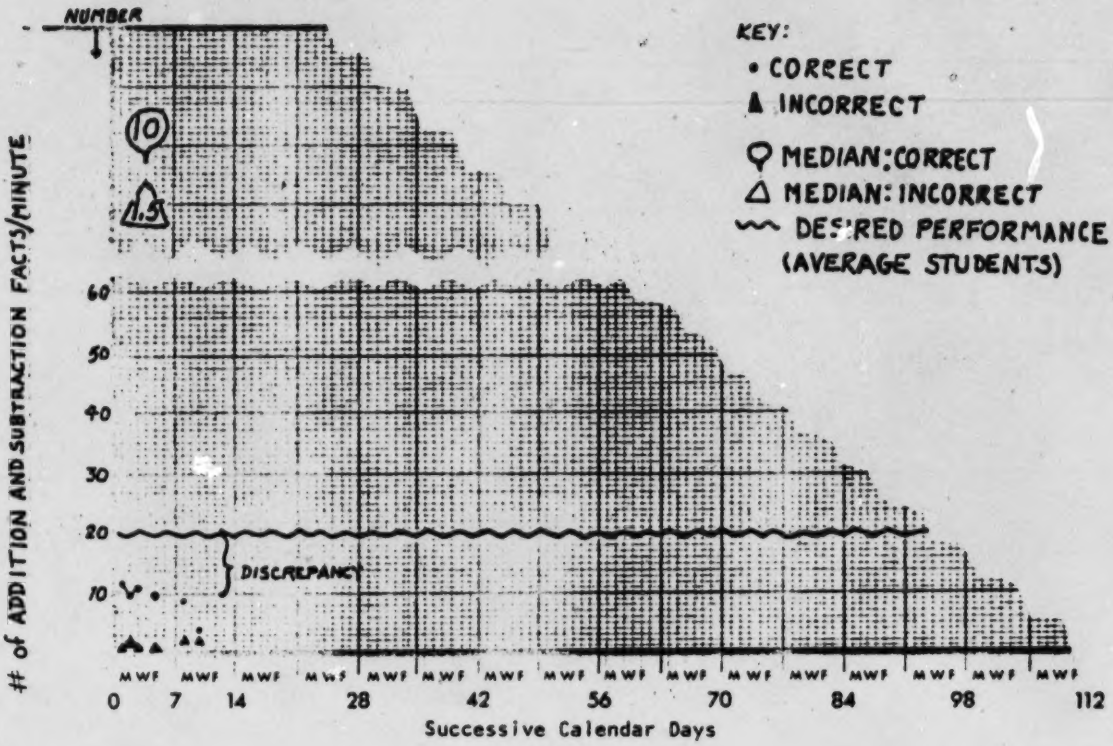

Figure 5. Performance Graph Showing a Discrepancy in Math Problems Completed.

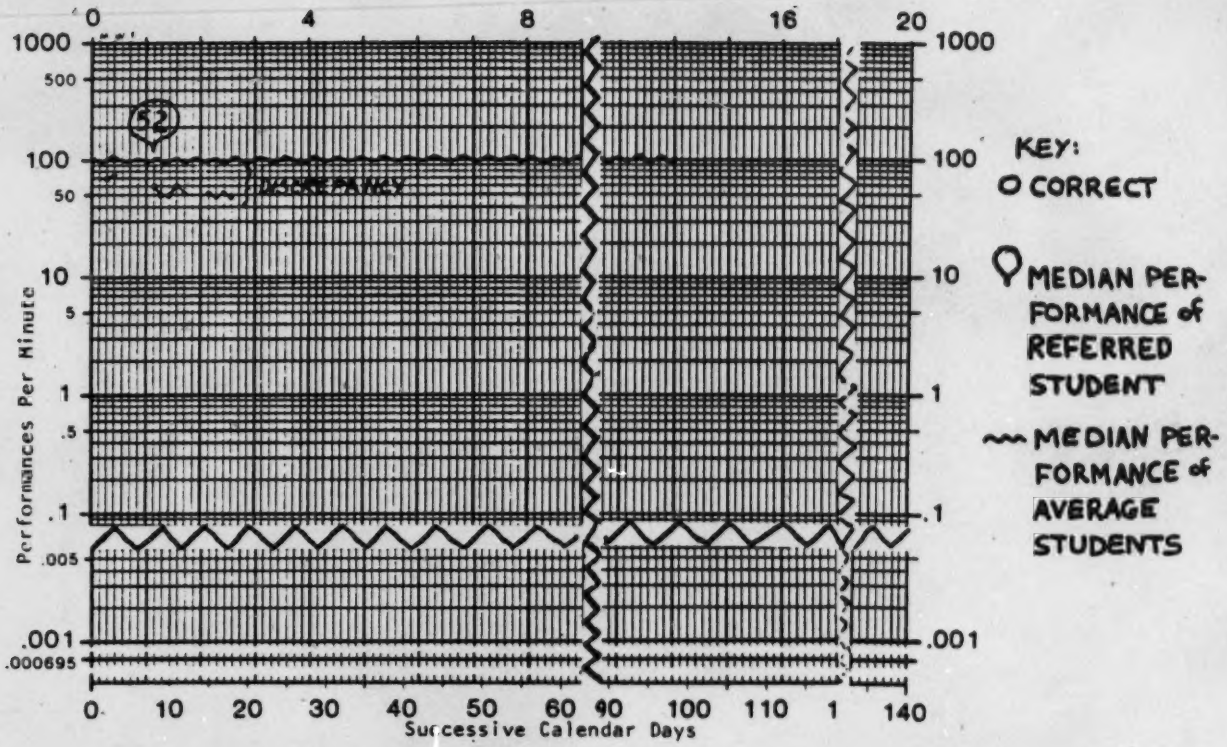

Figure 6. Equal-ratio Performance Graph for Oral Reading Performance

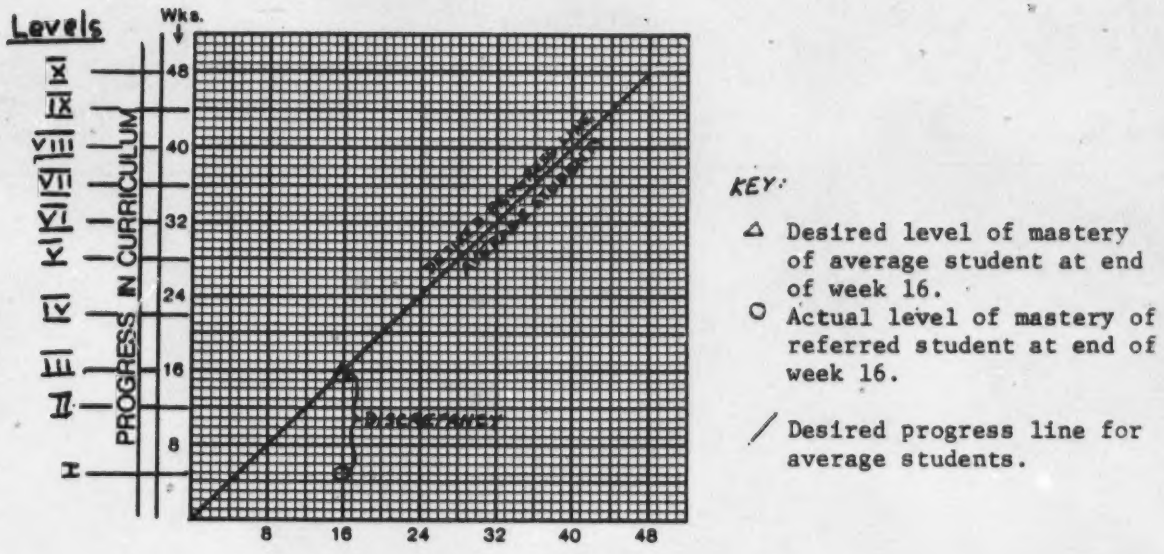

Figure 7. Weekly Rate of Progress in a Curriculum for One Year of School: Math

PUBLICATIONS

Institute for Research on Learning Disabilities
University of Minnesota

The Institute is not funded for the distribution of its publications. Publications may be obtained for $3.00 per document, a fee designed to cover printing and postage costs. Only checks and money orders payable to the University of Minnesota can be accepted. All orders must be prepaid.

Requests should be directed to: Editor
IRLD
350 Elliott Hall
75 East River Road
University of Minnesota
Minneapolis, Minnesota 55455

Ysseldyke, J. E. Assessing the learning disabled youngster: The state of the art (Research Report No. 1). November, 1977.

Ysseldyke, J. E., & Regan, R. R. Nondiscriminatory assessment and decision making (Monograph No. 7). February, 1979.

Foster, G., Algozzine, B., & Ysseldyke, J. Susceptibility to stereotypic bias (Research Report No. 3). March, 1979.

Algozzine, B. An analysis of the disturbingness and acceptability of behaviors as a function of diagnostic label (Research Report No. 4). March, 1979.

Algozzine, B., & McGraw, K. Diagnostic testing in mathematics: An extension of the PIAT? (Research Report No. 5). March, 1979.

Deno, S. L. A direct observation approach to measuring classroom behavior: Procedures and application (Research Report No. 6). April, 1979.

Ysseldyke, J. E., & Mirkin, P. K. Proceedings of the Minnesota roundtable conference on assessment of learning disabled children (Monograph No. 8). April, 1979.

Somwaru, J. P. A new approach to the assessment of learning disabilities (Monograph No. 9). April, 1979.

Algozzine, B., Forgnone, C., Mercer, C. D., & Trifiletti, J. J. Toward defining discrepancies for specific learning disabilities: An analysis and alternatives (Research Report No. 7). June, 1979.

Note: Monographs No. 1 - 6 and Research Report No. 2 are not available for distribution. These documents were part of the Institute's 1979-1980 continuation proposal, and/or are out of print.

Algozzine, B. The disturbing child: A validation report (Research Report No. 8). June, 1979.

Ysseldyke, J. E., Algozzine, B., Regan, R., & Potter, M. Technical adequacy of tests used by professionals in simulated decision making (Research Report No. 9). July, 1979.

Jenkins, J. R., Deno, S. L., & Mirkin, P. K. Measuring pupil progress toward the least restrictive environment (Monograph No. 10). August, 1979.

Mirkin, P. K., & Deno, S. L. Formative evaluation in the classroom: An approach to improving instruction (Research Report No. 10). August, 1979.

Thurlow, M. L., & Ysseldyke, J. E. Current assessment and decision-making practices in model programs for the learning disabled (Research Report No. 11). August, 1979.

Deno, S. L., Chiang, B., Tindal, G., & Blackburn, M. Experimental analysis of program components: An approach to research in CSDC's (Research Report No. 12). August, 1979.

Ysseldyke, J. E., Algozzine, B., Shinn, M., & McGue, M. Similarities and differences between underachievers and students labeled learning disabled: Identical twins with different mothers (Research Report No. 13). September, 1979.

Ysseldyke, J., & Algozzine, R. Perspectives on assessment of learning disabled students (Monograph No. 11). October, 1979.

Poland, S. F., Ysseldyke, J. E., Thurlow, M. L., & Mirkin, P. K. Current assessment and decision-making practices in school settings as reported by directors of special education (Research Report No. 14). November, 1979.

McGue, M., Shinn, M., & Ysseldyke, J. Validity of the Woodcock-Johnson psycho-educational battery with learning disabled students (Research Report No. 15). November, 1979.

Deno, S., Mirkin, P., & Shinn, M. Behavioral perspectives on the assessment of learning disabled children (Monograph No. 12). November, 1979.

Sutherland, J. H., Algozzine, B., Ysseldyke, J. E., & Young, S. What can I say after I say LD? (Research Report No. 16). December, 1979.

Deno, S. L., & Mirkin, P. K. Data-based IEP development: An approach to substantive compliance (Monograph No. 13). December, 1979.

Ysseldyke, J., Algozzine, B., Regan, R., & McGue, M. The influence of test scores and naturally-occurring pupil characteristics on psycho-educational decision making with children (Research Report No. 17). December, 1979.

Algozzine, B., & Ysseldyke, J. E. Decision makers' prediction of students' academic difficulties as a function of referral information (Research Report No. 18). December, 1979.

Ysseldyke, J. E., & Algozzine, B. Diagnostic classification decisions as a function of referral information (Research Report No. 19). January, 1980.